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EXAMINER	
ROSARIO, DENNIS	
ART UNIT	**PAPER NUMBER**
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DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/879,529	SHIMIZU ET AL.	
	Examiner	Art Unit	
	Dennis Rosario	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 04 January 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 and 5-31 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1 and 5-31 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 12 June 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☒ Other: Detailed Action

DETAILED ACTION

Response to Amendment

1. The amendment was received on January 4, 2005. Claims 1 and 5-31 are pending.

Response to Arguments

2. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 9 is objected to because of the following informalities:

Claim 9, line 5, "by doubled" ought to be amended to "by double" for a better understanding of the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1,5,15,20,21,24,25 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyake (US Patent 5,875,268 A).

Regarding claim 15, Miyake discloses an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer, comprising the steps of:

a) a vertical and horizontal directional linear interpolation unit for forming an image (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS is a unit that forms an image labeled as LINEARLY INTERPOLATED INFORMATION.) by linearly expanding (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53.) original image data (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100 as an input terminal.) in the vertical and horizontal directions (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100,as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions.); and

b) a vertical and horizontal directional correlation reduction processing unit for reducing the vertical and horizontal directional correlation of said image (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions.) through a rank order processing (Fig. 30, num. 416: DOT PLACING MEANS reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29, num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions through a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16.)...

... to generate a final expanded image (Fig. 30, num. 416: DOT PLACING MEANS reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29, num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions through a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16 to generate a final expanded image represented in fig. 29, num. 107, where num. 107 is an output or final image based on expanded image or LINEARLY INTERPOLATED INFORMATION, hence final expanded image 107 of fig. 29.).

Claim 5 is rejected the same as claim 15. Thus, argument similar to that presented above for the apparatus claim 15 is equally applicable to the method of claim 5.

Regarding claim 1, Miyake et al. discloses an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer, comprising the steps of:

a) reducing correlation in the vertical and horizontal directions of an image that is linearly expanded in the vertical and horizontal directions (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions.) to generate first expanded image data (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION.)...

... by a rank order processing (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION by a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16.) in a window having a predetermined size (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION by a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16 in a window of fig. 30,num. 413 having a predetermined size, 5 X 5.)...

... wherein a target pixel and its neighboring pixels (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION by a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16 in a window of fig. 30,num. 413 having a predetermined size, 3 X 3, wherein a target pixel, E, and its neighboring pixels, A,B,C,D,F,G,H and I.) in the linearly expanded image data (Fig. 30, num. 413: LINEARLY INTERPOLATED INFORMATION) are included;

b) performing linear interpolation (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond o fig. 29, label: LINEARLY INTERPOLATED INFORMATION.), based on correlation (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3.)...

... with a target pixel constituting said original image data (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol.) and neighboring pixels (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIHBORING PIXELS)".) arranged in oblique directions (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS).),...

... using said neighboring pixels to generate second expanded image data (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS) where pixels G,Q,S and I are used to generate second expanded image data as shown by a line of X and O symbols in fig. 10A.) by determining an interpolation direction (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS) where pixels G,Q,S and I are used to generate second expanded image data as shown by a line of X and O symbols in fig. 10A by determining an interpolation direction using fig. 9, num. 136: EDGE-ANGLE DISCRIMINATING MEANS.)...

... based on values of differences (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS) where pixels G,Q,S and I are used to generate second expanded image data as shown by a line of X and O symbols in fig. 10A by determining an interpolation direction using fig. 9, num. 136: EDGE-ANGLE DISCRIMINATING MEANS based on values of differences as shown in fig. 9,numerals 134 and 135.) between said target pixel and said neighboring pixels; and

c) employing (Fig. 29, num. 106 is an adder that is a form a employing.) said first expanded image data (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104.) and said second expanded image data (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104 and said second expanded image data as shown in fig. 29, label: LINERLY INTERPOLATED INFORMATION via num. 105.)...

... in an arithmetic combination (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104 and said second expanded image data as shown in fig. 29, label: LINERLY INTERPOLATED INFORMATION via num. 105 in an arithmetic combination using an adder 106 of fig. 29.) to generate a final image (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104 and said second expanded image data as shown in fig. 29, label: LINERLY INTERPOLATED INFORMATION via num. 105 in an arithmetic combination using an adder 106 of fig. 29 to generate a final image 107 of fig. 29.).

Note that Miyake states, "As many apparently widely different embodiments of the present invention can be made...(col. 26, lines 52-54)." Thus, various parts of the embodiments can be used interchangeably with other embodiments "without departing from the spirit and scope thereof (col. 26, lines 53,54)."

Regarding claim 20, Miyake discloses an article of manufacture comprising:

a) a computer usable medium having computer readable program code means ("algorithm" in col. 14, line 57) embedded therein for causing image transformation,

the computer readable program code means in said article of manufacture comprising:

b) computer readable program code means for causing a computer to effect the steps of claim 5.

Claims 21, 24, 25 and 29 are rejected the same as claim 20. Thus, argument similar to that presented above for claim 21 is equally applicable to claims 25 and 29.

6. Claims 7,8,10,11,12,13,14,16,17,22,26,28 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Aoyama et al. (US Patent 6,535,651 B1).

Regarding claim 7, Aoyama et al. discloses an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer, comprising the steps of:

a) reading a target pixel (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS reads a target pixel, S_{ij}, as shown in fig. 2A.) and neighboring pixels (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS reads a target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A.) thereof in original image data (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS reads a target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A where fig. 2A shows a portion of original data from fig. 1,num. 10: STORAGE MEANS.);

b) employing said target pixel and said neighboring pixels (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS reads or employs a target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A.) to calculate directional differences (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS reads or employs a target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A, to calculate directional differences as shown in figures 9A-D,10A-D and 11A-D and mentioned in col. 25, lines 27-56.)...

... for the right oblique and the left oblique directions (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS reads or employs a target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A, to calculate directional differences as shown in figures 9A-D,10A-D and 11A-D and mentioned in col. 25, lines 27-56 where right and left oblique differences are mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left".);

c) employing said directional differences (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS employs the right and left oblique differences are mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left".) to determine a strong correlated direction (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS employs the right and left oblique differences are mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left" to determine a strong correlated direction or "specified [,which corresponds to the claimed strong correlated direction,] that the oblique image edge portion is inclined upwardly to the left".); and

d) performing linear interpolation (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49.) for said target pixel (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49 for said target pixel "Sij" in col. 28, line 50.) using said neighboring pixels (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49 for said target pixel "Sij" in col. 28, line 50 using said neighboring pixels "S(i+1), and (Si(j+1)" in col. 28, line 50.)...

... arranged (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49 for said target pixel "Sij" in col. 28, line 50 using said neighboring pixels "S(i+1), and (Si(j+1)" in col. 28, line 50 arranged as shown in fig. 2B.) in said strong correlated direction (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49 for said target pixel "Sij" in col. 28, line 50 using said neighboring pixels "S(i+1), and (Si(j+1)" in col. 28, line 50 arranged as shown in fig. 2B in strong correlated direction or "specified [,which corresponds to the claimed strong correlated direction,] that the oblique image edge portion is inclined upwardly to the left [inclined upwardly to the right as shown in fig. 2B by the diagonal line between points Si(j+1) and S(i+1)j].").

Regarding claim 8, Aoyama et al. discloses the image transform method according to claim 7, further comprising the steps of:

a) reading peripheral pixels (Fig. 3, labels b,c,d,e) arranged within a predetermined mask range (Fig. 3, labels b,c,d,e are arranged with a 4 X 4 mask.) adjacent to said target pixel (Fig. 3, labels b,c,d,e are arranged with a 4 X 4 mask adjacent to said target pixel S1 or INTERPOLATION POINT.) and/or said neighboring pixels; and

b) accumulating differences (As mentioned in col. 24, lines 57-67.) between said peripheral pixels, and between said target pixel and said neighboring pixels; and

c) determining an interpolation direction (Fig. 1, num. 41 determines a direction for interpolation.), based on the cumulative value of said differences (Based on the results from fig. 1,num. 31 and mentioned in col. 24, lines 57-67.), and

d) performing interpolation (Fig. 1,num. 45 performs interpolation based on fig. 1,num. 41 which determines a direction for interpolation.) in said interpolation direction.

Regarding claim 10, Aoyama et al. discloses an image processing apparatus comprising:

a) input means (Fig. 1, num. 10: STORAGE MEANS is an input means.) for entering original image data (Fig. 1, num. 10: STORAGE MEANS is an input means for entering original image data, "Sorg" as shown in fig. 1.) to be expanded (Fig. 1, num. 10: STORAGE MEANS is an input means for entering original image data, "Sorg" as shown in fig. 1 to be expanded or interpolated using fig. 1,num. 30: INTERPOLATING APPARATUS.);

b) vertical and horizontal directional interpolation means (Fig. 1, num. 46: SECOND OPERATION MEANS performs a "vertical direction or the horizontal direction" in col. 27, line 55 "interpolating" in col. 23, line 37 via "The first interpolating operation means 40" as shown in fig. 1.) for interpolating said original image data (Fig. 1, num. 46: SECOND OPERATION MEANS performs a "vertical direction or the horizontal direction" in col. 27, line 55 "interpolating" in col. 23, line 37 via "The first interpolating operation means 40" as shown in fig. 1 for interpolating said original image data, Sorg.)...

... in the vertical and horizontal directions (Fig. 1, num. 46: SECOND OPERATION MEANS performs a "vertical direction or the horizontal direction" in col. 27, line 55 "interpolating" in col. 23, line 37 via "The first interpolating operation means 40" as shown in fig. 1 for interpolating said original image data, Sorg, in the vertical and horizontal directions as shown in fig. 5B, where in fig. 5B shows horizontal and vertical lines that corresponds to the claimed horizontal and vertical interpolation.);

c) vertical and horizontal directional correlation reduction means (Fig. 1, num. 46: SECOND OPERATION MEANS is a means for vertical and horizontal directional correlation reduction or "an interpolation point having a markedly different signal value does not occur on the image edge portion" in col. 30, lines 54-56 and in col. 34, lines 64-66 ; thus, "a step-like pattern is not enlarged at the oblique image edge portion" in col. 34, lines 66,67. Thus, according to the specification the claimed reduction performs "reducing the step-shapes or chain shapes of oblique lines" on page 14 of the specification which Aoyama et al. does using fig. 1,num. 46 which reduces or "a step-like pattern is not enlarged at the oblique image edge portion" in col. 34, lines 66,67.) for reducing correlation of the obtained image in the vertical and horizontal directions;

d) oblique direction detection means (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS.) for detecting an oblique direction (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS detects or specifies right and left oblique directions as mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left".)...

...having a strong correlation (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS detects or specifies right and left oblique directions as mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left" to determine a strong correlated direction or "specified [,which corresponds to the claimed strong correlated direction,] that the oblique image edge portion is inclined upwardly to the left".) with a target pixel and neighboring pixels (target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A) in said original image
data; and

e) directional interpolation means (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49.) for employing said neighboring pixels in said detected oblique direction to perform interpolation in said oblique direction (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49 for said target pixel "Sij" in col. 28, line 50 using said neighboring pixels "S(i+1), and (Si(j+1)" in col. 28, line 50 arranged as shown in fig. 2B in strong correlated direction or "specified [,which corresponds to the claimed strong correlated direction,] that the oblique image edge portion is inclined upwardly to the left [inclined upwardly to the right as shown in fig. 2B by the diagonal line between points Si(j+1) and S(i+1)j].").

Regarding claim 11, Aoyama et al. discloses the image processing apparatus according to claim 10, further comprising:

a) generation means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS) for generating expanded image data (Fig. 1,num. 60: IMAGE REPRODUCING MEANS generates expanded image data based on S' as shown in fig 1.) based on an image obtained by said vertical and horizontal directional correlation reduction means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS generates expanded image data based on S' as shown in fig 1 based on an image obtained by said vertical and horizontal directional correlation reduction means of fig. 1, num. 46: SECOND OPERATION MEANS.) and an image (S' as shown in fig 1 represents an image.) obtained by said oblique directional interpolation means (S' as shown in fig 1 represents an image obtained from fig. 1, num. 45: FIRST OPERATION MEANS.).

Regarding claim 12, Aoyama et al. discloses the image processing apparatus according to claim 11, further comprising:

a) input means for entering, as an adjustment value (Fig. 1,num. 51: SHARPNESS INSTRUCTION INPUT MEANS), the personal preference of a user concerning image quality (Fig. 1,num. 51: SHARPNESS INSTRUCTION INPUT MEANS allows a user to "adjust[ ]" in col. 35, line 11 the sharpness value; hence, "a visible image having good image quality can be reproduced" in col. 35, lines 12,13.),

b) wherein said generation means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS) employs said adjustment value (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value.) to synthesize said image (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value to synthesize or reproduce said image.)...

...obtained by said vertical and horizontal directional correlation reduction means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value to synthesize or reproduce said image obtained by said vertical and horizontal directional correlation reduction means of fig. 1, num. 46: SECOND OPERATION MEANS.) with said image obtained by said oblique directional interpolation means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value to synthesize or reproduce said image, S' as shown in fig. 1, obtained by said vertical and horizontal directional correlation reduction means of fig. 1, num. 46: SECOND OPERATION MEANS with said image, S' as shown in fig. 1, obtained by said oblique directional interpolation means of fig. 1, num. 45: FIRST OPERATION MEANS which performs interpolation as mentioned in col. 28, lines 47-49.).

Regarding claim 13, Aoyama et al. discloses the image processing apparatus according to claim 10, wherein said vertical and horizontal directional correlation reduction means (Fig. 1, num. 46: SECOND OPERATION MEANS) performs the ranked median value selection (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on "selected sampling points" in col. 34, line 63.), for the target pixel and its neighboring pixels (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on "selected sampling points" in col. 34, line 63 for the target pixel and its neighboring pixel as shown in fig 5B and mentioned in col. 34, lines 58,59: "four sampling points".)...

... in the linearly expanded image data (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on "selected sampling points" in col. 34, line 63 for the target pixel and its neighboring pixel as shown in fig 5B and mentioned in col. 34, lines 58,59: "four sampling points" in the linearly expanded image data as shown in fig. 5A where the X's represent linearly expanded image data and shown in fig. 5B labeled as Sm and Sn.), and thereby reduces the correlation of an image (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on "selected sampling points" in col. 34, line 63 for the target pixel and its neighboring pixel as shown in fig 5B and mentioned in col. 34, lines 58,59: "four sampling points" in the linearly expanded image data as shown in fig. 5A where the X's represent linearly expanded image data and shown in fig. 5B labeled as Sm and Sn, and thereby reduces the correlation or "free from any step-like pattern" in abstract of an image.) in the vertical and horizontal direction.

Regarding claim 14, Aoyama et al. discloses the image processing apparatus according to claim 10, wherein said oblique direction detection means (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS.) employs differences (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS employs "differences" in col. 25, line 31.) between said target pixel and said neighboring pixels to detect, with strong correlation, said oblique direction, and said oblique directional interpolation means performs linear interpolation in said oblique direction detected by said oblique direction detection means.

Claim 16 are rejected the same as claim 7. Thus, argument similar to that presented above for the method of claim 7 is equally applicable to that apparatus of claim 6.

Claim 17 are rejected the same as claim 8. Thus, argument similar to that presented above for claim 8 is equally applicable to claim 17.

Regarding claim 22, Aoyama et al. discloses an article of manufacture comprising:

a) a computer usable medium (Fig. 1,num. 45) having computer readable program code means ("algorithms" in col. 23, line 66) embedded therein for causing image transformation,

the computer readable program code means in said article of manufacture comprising:

b) computer readable program code means for causing a computer to effect the steps of claim 5.

Claims 26,28 and 30 are rejected the same as claim 22. Thus, argument similar to that presented above for claim 22 is equally applicable to claims 26,28 and 30.

7. Claims 9,18,23 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Sonobe (US Patent 5,649,034 A).

Regarding claim 9, Sonobe discloses an image transform method comprising:

a) an input step of entering original image data (Fig. 10, label: "1" shows an input image.) to be expanded (Fig. 10, label: "1" shows an input image to be expanded as shown in the image of label 2 of fig. 10.) by a magnification of two or more (Fig. 10, label: "1" shows an input image to be expanded as shown in label 2 of fig. 10 using a magnification of more than two by counting the number of squares for dimension for each respective image and comparing the number of squares for each dimension.);

b) a first process step (Fig. 10, label "3" is a process step.) of reducing (Fig. 10, label "3" is a process step of reducing or smoothing as shown by the last step, label 19 in relation to the second step, label 2.) the step-shapes or chain-shapes of oblique lines (Fig. 10, label "3" is a process step of reducing or smoothing as shown by the last step, label 19 in relation to the second step, label 2 the step-shapes as shown in fig. 10, label "2" where 2 step-shapes are shown on the bottom portion of the letter/character.) appearing when said original image data are expanded by doubled or greater in size (Fig. 10, label "3" is a process step of reducing or smoothing as shown by the last step, label 19 in relation to the second step, label 2 the step-shapes as shown in fig. 10, label "2" where 2 step-shapes are shown on the bottom portion of the letter/character appearing when expanded as mentioned in col. 2, lines 14-16.);

c) a second process step of:

c1) expanding (Fig. 10, label "18" is an image that is expanded in relation to label "2" of fig. 10.), in the oblique direction (Fig. 10, label "18" is an image that is expanded in relation to label "2" of fig. 10 in the oblique direction shown on the bottom portion of the letter/character.), the structure (Fig. 10, label "18" is an image that is expanded in relation to label "2" of fig. 10 in the oblique direction shown on the bottom portion of the letter/character structure shown as a black area of label 2.) of said original image data (Fig. 10, label "18" is an image that is expanded in relation to label "2" of fig. 10 in the oblique direction shown on the bottom portion of the letter/character structure shown as a black area of label 2 where label 2 is of said original image data 1 of fig. 10.), and

c2) reducing a bulging shape (Fig. 10, label 18 shows a top portion with six black squares of the letter/character that has a bulging shape that is reduced or smoothed in relation to a bulging shape as shown by the top portion of the letter/character as shown in label 2 that has 4 black squares that form a black square.) appearing when a portion is expanded (Fig. 10, label 18 shows a top portion with six black squares of the letter/character that has a bulging shape that is reduced or smoothed in relation to a bulging shape as shown by the top portion of the letter/character as shown in label 2 that has 4 black squares that form a black square where the bulging top portion of label 18 appears when the top portion of label 1 of fig. 10 is expanded as shown in label 2 of fig. 10.)...

... whereat vertical and horizontal lines of said original image data cross each other (Fig. 10, label 18 shows a top portion with six black squares of the letter/character that has a bulging shape that is reduced or smoothed in relation to a bulging shape as shown by the top portion of the letter/character as shown in label 2 that has 4 black squares that form a black square where the bulging top portion of label 18 appears when the top portion of label 1 of fig. 10 is expanded as shown in label 2 of fig. 10 whereat vertical and horizontal lines of said original image cross each other as shown as a black plus sign in fig. 10, label "2".); and

d) an output step (Fig. 10, label: "19" is an output step that corresponds to fig. 8,num. 36:OUTPUT INTERFACE) of outputting an image expanded by said magnification of two or more using said first and second process steps.

Claim 18 is rejected the same as claim 9. Thus, argument similar to that presented above for claim 9 is equally applicable to claim 18 except for the additional limitation of a means which is disclosed by Sonobe, comprising:

a) first image expansion means (Fig. 9, label:WORK1 is a first image expansion means that is a portion of fig. 8, label 32:FONT ROM.);

b) second image expansion means (Fig. 9, label:WORK2 is a second image expansion means that is a portion of fig. 8, label 32:FONT ROM.)

c) display means (Fig. 8, num. 36: OUTPUT INTERFACE).

Regarding claim 23, Sonobe discloses an article of manufacture comprising:

a) a computer usable medium (Fig. 8, num. 34: PROGRAM ROM) having computer readable program code means embedded therein for causing image transformation,

the computer readable program code means in said article of manufacture comprising:

b) computer readable program code means for causing a computer to effect the steps of claim 5.

Claims 27 and 31 are rejected the same as claim 23. Thus, argument similar to that presented above for claim 23 is equally applicable to claims 27 and 31.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake (US Patent 5,917,963 A) in view of Lee (US Patent 6,285,798 B1).

Regarding claim 6, Miyake teaches an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer comprising the steps of:

a) forming an image by linearly expanding original image data in the vertical and horizontal directions (Fig. 5,num. 103: LINEAR INTERPOLATION PORTION expands an original image in the "vertical... and horizontal direction[s]" in col. 5, lines 58,59.); and

b) reducing (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53).") the vertical and horizontal directional correlation of said image (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53)." The vertical and horizontal directional correlation from the output of fig. 5,num. 103: LINEAR INTERPOLATION PORTION via num. 105.) through a rank order processing (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53)." The vertical and horizontal directional correlation from the output of fig. 5,num. 103: LINEAR INTERPOLATION PORTION via num. 105 and through a rank order processing as shown in fig. 5,num. 104: MEDIAN VALUE CALCULATION PORTION which arranges values from a MIN to MAX from fig. 5,num. 102 and selects the median or middle value.)...

... to generate a final expanded image (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53)." The vertical and horizontal directional correlation from the output of fig. 5,num. 103: LINEAR INTERPOLATION PORTION via num. 105 and through a rank order processing as shown in fig. 5,num. 104: MEDIAN VALUE CALCULATION PORTION which arranges values from a MIN to MAX from fig. 5,num. 102 and selects the median or middle value to generate a final expanded image 109 of fig. 5.)

c) determining, for said expanded image, whether the contrast in said original image data can be maintained (Fig. 1,num. 107: LUT determines for said expanded image of fig. 5,num. 109 whether the contrast or "sharpness" in col. 7, line 13 mentioned in the context of "contrast data" in col. 7, line 10 in said "original [image] data" in col. 7, line 15 outputted from fig. 5,num. 101: LINE BUFFER can be maintained or "controlled" in col. 7, line 14.) at a predetermined level (Fig. 1,num. 107: LUT determines for said expanded image of fig. 5,num. 109 whether the contrast or "sharpness" in col. 7, line 13 mentioned in the context of "contrast data" in col. 7, line 10 in said "original [image] data" in col. 7, line 15 outputted from fig. 5,num. 101: LINE BUFFER can be maintained or "controlled" in col. 7, line 14 at a predetermined level or "depending on a size of an edge associated with the original data" in col. 7, lines 14,15.); and

Miyake does not teach the additional limitations, but does suggest modifying fig. 5, num. 201 with a "high pass filter" in col. 9, line 55 for "edge emphasis" in col. 9, line 54.

Lee, uses a high pass filter (fig. 4,num. 60: FILTER) to emphasize an edge (fig. 4,num. 60: FILTER extracts "the high frequency details" in col. 11, line 50) as suggested by Miyake, comprising:

d) extracting a high frequency component (Fig. 4,num. 70: FILTER extracts "the high frequency details" in col. 11, line 50) from said expanded image (Fig. 4,num. 60: FILTER extracts "the high frequency details" in col. 11, line 50 from an image, D as shown in fig. 4.), when a contrast cannot be maintained (Fig. 4,num. 70: FILTER extracts "the high frequency details" in col. 11, line 50 from an image, D as shown in fig. 4 when a contrast cannot be maintained as determined in fig. 4,num. 90: CONTRAST GAIN-CONTROL (CGC) which maintains or "suppresse[s illumination edges] (col. 11, lines 56,57)".) at said predetermined level (Fig. 4,num. 70: FILTER extracts "the high frequency details" in col. 11, line 50 from an image, D as shown in fig. 4 when a contrast cannot be maintained as determined in fig. 4,num. 90: CONTRAST GAIN-CONTROL (CGC) which maintains or "suppresse[s illumination edges] (col. 11, lines 56,57)" where the illumination edges are suppressed at a predetermined level or "large gradient amplitudes" in col. 11, line 27.), and

b) adding said frequency component (Fig. 4,num. 70 contains a summation symbol that corresponds to the claimed adding said frequency component or high frequency details.)...

... multiplied by a constant (Fig. 4,num. 70 contains a summation symbol that corresponds to the claimed adding said frequency component or high frequency details multiplied via num. 110a which corresponds to a factor "G_1" of fig. 4 and fig .2 shows a multiplication symbol.) to said expanded image (Fig. 4,num. 70 contains a summation symbol that corresponds to the claimed adding said frequency component or high frequency details multiplied via num. 110a, which corresponds to a factor "G_1" of fig. 4 and fig .2 shows a multiplication symbol, to said image D or D_1 of fig. 4.), or subtracting said frequency component multiplied by a constant from said
expanded image.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Miyake's teaching of using an expanded image of fig. 5,num. 109 and high pass filter with Lee's teaching of contrast with filter that extract high frequency details of fig. 4, because Lee's teaching of fig. 4 suppresses "artifacts" in col. 11, line 8.

10. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sonobe (US Patent 5,649,034 A) in view of Daly et al. (US Patent 4,907,282 A).

Regarding claim 19, Sonobe does not teach the limitation of claim 19, but does suggest anti-aliasing as shown in fig. 6 by two black squares at the bottom of fig. 6 that are not desirable and suggests a technique as shown in fig. 7 to correct the anti-aliasing as shown by the bottom right of fig. 7.

Daly et al. does teach anti-aliasing as suggested by Sonobe and shown in Daly et al., fig. 2a, comprising:

a) original color image data (Fig. 2a is original color image data.) includes thin lines (Fig. 2a is original color image data includes thin lines as shown as a grid.) obtained by anti-aliasing (Fig. 2a is original color image data includes thin lines as shown as a grid obtained in the letter "b" by antialising" in col. 7, line 41.), and

b) second image expansion means performs interpolation (Fig. 13b, num. 1329: LOOK UP VALUE IN INTERPOLATE TABLE is a means that performs interpolation.) based on pixels (Fig. 13b, num. 1329: LOOK UP VALUE IN INTERPOLATE TABLE is a means that performs interpolation based on pixels from fig. 2b.) constituting the original thin lines (Fig. 13b, num. 1329: LOOK UP VALUE IN INTERPOLATE TABLE is a means that performs interpolation based on pixels from fig. 2b constituting original thin lines as shown as a grid.), not based on pixels obtained by anti-aliasing (Fig. 13b, num. 1329: LOOK UP VALUE IN INTERPOLATE TABLE is a means that performs interpolation based on pixels from fig. 2b constituting original thin lines as shown as a grid, not based on pixels obtained by anti-aliasing via fig. 13b, num. 1327:SUBTRACT BACKGROUND COLOUR FROM DRAWING COLOR that removes the background color or the grid of lines as shown in fig. 2a and performs interpolation in a subsequent step 1329.).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Sonobe's suggestion of anti-aliasing with Daly et al.'s teaching of anti-aliasing, because Daly et al.'s teaching reduces anti-aliasing and distortion in col. 4, line 17.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 6-3.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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